Mathematics for Economists
ECO 740
Section 1
MW 5:30 to 6:45 PM
CBC C115
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Fall 2013


Office Hours: MW 4:00 to 5:30 PM and by appointment

Learning Outcomes: Students who successfully complete this course will learn the basic tools of differential calculus, matrix algebra, difference equations, and game theory used in our MA program. In addition, all of the tools receive illustration with economic examples from both microeconomic and macroeconomic theory as well as other specific field courses such as industrial organization.

Evaluation: The course evaluation for each student involves two separate components. First, each student must do the 14 homework assignments. I drop the four lowest scores. Homework assignments are due in the Wednesday class. Second, each student will take the three in-class exams. The first two exams are given in the Wednesday class. The final exam is not comprehensive, but only covers the material not covered in exams 1 and 2. The final exam is given during the exam week on Wednesday, December 11 from 6:00 to 8:00 PM. While I prefer to maintain some flexibility in the weights assigned to the components in the final course grade, I will weight the component parts as follows: 35% for the graded homework assignments, 15% for the first exam, and 25% each for the last two exams.

Incomplete Grades: The instructor can grant an incomplete grade (I) when a student satisfactorily completes all course work up to the withdrawal date of that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. A student who receives an I is responsible for making up whatever work was lacking at the end of the semester. If the student does not complete course requirements within the time indicated, the student receives a grade of F and the GPA will be adjusted accordingly. Students who are fulfilling an I do not register for the course but make individual arrangements with the instructor who assigned the I grade.

WebCampus: This course is a WebCampus course. I will post the course outline, homework assignments, other handouts, and so on at the WebCampus site. You can access this site 24/7, except for scheduled maintenance on the system and unexpected downtimes due to technical glitches.

Academic Integrity: Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility, and professionalism. By choosing to join the UNLV community, students accept the expectations of the Academic Misconduct Policy and are encouraged when faced with choices to always take the
ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV’s function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at: http://studentconduct.unlv.edu/misconduct/policy.html.

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Disabilities: The Disability Resource Center (DRC) determines accommodations that are “reasonable” in promoting the equal access of a student reporting a disability to the general UNLV learning experience. Faculty will only provide students course adjustment after having received an “Academic Accommodation Plan” from the DRC. UNLV complies with the provisions set forth in Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. The DRC is located in the Student Services Complex (SSC-A), Room 143, phone (702) 895-0866, fax (702) 895-0651. For additional information, please visit: http://drc.unlv.edu/.

Religious Holidays Policy: Any student missing work because of observance of religious holidays will receive an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It is the student's responsibility to notify the instructor no later than the last day of late registration of his or her intention to participate in religious holidays, which do not fall on state holidays or periods of class recess. This policy shall not apply in the event that administering the test or examination at an alternate time would impose an undue hardship on the instructor or the university which could have been avoided. For additional information, please visit: http://catalog.unlv.edu/content.php?catoid=4&navoid=164.

Tutoring: The Academic Success Center (ASC) provides tutoring and academic assistance for all UNLV students taking UNLV courses. Students are encouraged to stop by the ASC to learn more about subjects offered, tutoring times and other academic resources. The ASC is located across from the Student Services Complex (SSC). Students may learn more about tutoring services by calling (702) 895-3177 or visiting the tutoring web site at the following internet address: http://academicsuccess.unlv.edu/tutoring/.

UNLV Writing Center: One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: http://writingcenter.unlv.edu/.

Rebelmail: By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to
the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu.

Course Outline and Readings:

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<th>Topics Covered</th>
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<td>Review of derivatives</td>
<td>BBT: Chapters 1, including appendix, and 2.</td>
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<td>Rules for derivatives</td>
<td>D: Chapters 1, 2, 3, 4, 7, and 8.</td>
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<td></td>
<td>Partial derivatives</td>
<td>Practice Problems: A1(a),(b), (f),(h); A2(a),(f); A3(a),(d); A6(a),(c), 2.3, 2.5</td>
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<td>Concavity and convexity</td>
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<td>System of equations</td>
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<td>• Matrix form</td>
<td>D: Chapters 10, 11, and 12.</td>
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<td>Definition of scalars, vectors, and matrices</td>
<td>Practice Problems: 3.2, 3.3, 3.10</td>
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<td>• Addition, subtraction, and multiplication</td>
<td>Homework 2: 3.11, 3.12</td>
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<td>Identity matrix</td>
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<td>Applying matrix algebra</td>
<td>BBT: Chapter 4.</td>
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<td>• One competitive market</td>
<td>D: Chapters 10, 11, and 12.</td>
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<td>• Two firms with differentiated products</td>
<td>Practice Problems: 4.1, 4.4</td>
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<td>• Simple and complex duopoly</td>
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<td>• Simple Keynesian model</td>
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<td>Differentials</td>
<td>D: Chapters 5, 6, and 9.</td>
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<td>Practice Problems: 5.7(a),(b); 5.8(a),(b)</td>
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<td>Implicit function theorem</td>
<td>Homework 4: 5.5(b), 5.6(b)</td>
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<td>Level curves</td>
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<td>Homogeneity, Euler’s theorem, and corollary</td>
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<td>Exam 1 (weeks 1 to 3)</td>
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<td>Applications of multivariate calculus</td>
<td>BBT: Chapter 6.</td>
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<td>• Balanced budget multipliers</td>
<td>D: Chapters 5, 6, and 9.</td>
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<td>• IS-LM-(AD)-AS model</td>
<td>Practice Problems: 6.5, 6.14, 6.16, 6.28</td>
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<td>• Fiscal and monetary policy effectiveness</td>
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<td>• Excise tax on monopolist</td>
<td>Homework 4 due.</td>
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<td>• Duopoly</td>
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<td>• Homogeneity of consumer demands</td>
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<td>• Homogeneity of input demands</td>
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| Week 6 | One-variable optimization: Review  
Two-variable optimization  
Hessian determinants  
Multiple-variable optimization  
Concavity, convexity, and optimization  
Comparative static analysis | BBT: Chapter 7.  
D: Chapters 5, 6, and 9.  
Practice Problems: 7.4(a), 7.9(e)  
Homework 6: 7.1(e), 7.9(b)  
Homework 5 due. |
|---|---|
| Week 7 | Examples of multivariate optimization  
• Competitive firm input choice  
• Efficiency wages  
• Multi-market monopoly profit maximization  
• Deriving least squares estimates | BBT: Chapter 8.  
D: Chapters 5, 6, and 9.  
Practice Problems: 8.2, 8.4, 8.9  
Homework 7: 8.11  
Homework 6 due. |
| Week 8 | Constrained optimization  
Lagrangian method  
Bordered Hessian determinants  
Quasi-concavity, quasi-convexity, and constrained optimization  
Comparative static analysis  
Value functions: Preview | BBT: Chapter 9.  
D: Chapters 5, 6, and 9.  
Practice Problems: 9.1(d), 9.2(d), 9.3(d), 9.4(d), 9.5  
Homework 8: 9.1(d), 9.3(d)  
Homework 7 due. |
| Week 9 | Examples of constrained optimization  
• Cost minimization and input demands  
• Profit maximization and input demands  
• Utility maximization and individual demands  
• Labor supply  
• Intertemporal consumption: Time preference  
• Macro tradeoffs: Phillips curves | BBT: Chapter 10.  
D: Chapters 5 and 6.  
Practice Problems: 10.3(a), (c),(d), 10.17(c)  
Homework 9: 10.16(a)  
Homework 8 due. |
| Week 10 | Professor Viner and the cost curves  
Value function  
Envelope theorem  
Interpretation of Lagrangian multiplier  
Applications of value function and envelope theorem  
• Duality  
• Roy’s identity  
• Shepard’s lemma  
• Slutsky equation  
• Cost curves and Professor Viner: Revisited  
• Reciprocity relations | BBT: Chapters 13 and 14.  
D: Chapter 13.  
Practice Problems: 13.4, 13.7, 14.1  
Homework 10: 13.6  
Homework 9 due. |
| Week 11 | Applications of value function and envelope theorem  
• Duality  
• Roy’s identity  
• Shepard’s lemma  
• Slutsky equation  
• Cost curves and Professor Viner: Revisited  
• Reciprocity relations  
Difference equations  
• First order  
• Phase diagrams  
• Non-linear  
• Systems  
Differential equations  
• First order  
• Phase diagrams  
• Systems | BBT: Chapter 14 and 15.  
D: Chapter 13, 16, and 17.  
Practice Problems: 14.3, 14.4, 15.1(b), 15.2(d)  
Homework 11: 14.5  
Homework 10 due. |
| Week 12 | Difference equations  
• First order  
• Phase diagrams  
• Non-linear  
• Systems  
Differential equations  
• First order  
• Phase diagrams  
• Systems  
Partial-adjustment models  
Marshallian quantity adjustment  
Cobweb model  
Cournot duopoly  
IS, LM, Fed reaction function  
Solow growth model | BBT: Chapter 15 and 16.  
D: Chapter 16 and 17.  
Practice Problems: 15.6(b), 15.6(e)  
Homework 12: 15.2(c), 15.4(c)  
Homework 11 due. |
|---|---|
| Week 13 | Static games: Complete information  
Games in normal form  
Dominance and iterated elimination  
Nash equilibrium  
Mixed strategies  
Applications of static games  
• Two-firm investment in natural monopoly setting  
• Cournot duopoly model revisited  
• Bertrand duopoly model  
• Rent-seeking behavior  
• Public goods | BBT: Chapter 17 and 18.  
Practice Problems: 16.6, 16.23  
Homework 13: 16.26  
Homework 12 due. |
| Week 14 | Applications of static games  
• Two-firm investment in natural monopoly setting  
• Cournot duopoly model revisited  
• Bertrand duopoly model  
• Rent-seeking behavior  
• Public goods  
Dynamic games: Complete information  
Games in extensive form  
Equilibrium in extensive-form games  
Sub-game perfect Nash equilibrium  
Two-stage games  
Repeated games | BBT: Chapter 18 and 19.  
Practice Problems: 17.1(b), 17.2(c)  
Homework 14: 17.4  
Homework 13 due. |
| Week 15 | Applications of dynamic games  
• Sequential bargaining models  
• Trade policy and oligopoly  
• Two-stage duopoly game  
• Repeated games and oligopoly | BBT: Chapter 20.  
Practice Problems: 19.1(c), 19.2(c), 20.1, 20.2  
Homework 14 due. |
| Week 16 | Exam 3 (weeks 10 to 15) |